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Educational Television Series 1968-69

Teachers' Guide

Science

Junior Division

Educational Television Branch
ONTARIO DEPARTMENT OF EDUCATION
1670 Bayview Avenue, Toronto 17

SCIENCE – JUNIOR DIVISION

10 programs of 20 minutes each for the junior grades Repeated from 1967-68.

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FOSSILS & DINOSAURS

INTRODUCTION

The general purpose of these programs is to stimulate an awareness of the continuing evolutionary process of life. The programs have been designed to complement the study of living things in the past, a topic suggested for fourth year pupils in the Interim Revision Science (P1, J1), although the programs are equally suitable for grades 5 and 6. It is hoped that the presentation of material, which is not readily available to the classroom teacher, by the Curators of Geology and Vertebrate Palaeontology at the Royal Ontario Museum, will serve as a source of information and enrichment, as well as a stimulus to further enquiry on the part of the pupils.

PROGRAM 1

FOSSILS

The specific aim of this program is to show that fossils are really a record of life. It is hoped that the viewing class will be motivated to search for fossils themselves, providing the surrounding area is suitable.

PROGRAM CONTENT

Dr. Tovell, Curator of Geology, opens the program by asking the viewers if they had ever thought how many different plants and animals there are in the world. He explains that a fossil is, in some way, the ancestor to some of the forms of life we have on earth today. A short film clip shows children looking for fossils among the sedimentary rocks of the Humber River Valley area near Toronto. Dr. Tovell then uses the reconstruction of of life in Ontario 450 million years ago in the Royal Ontario Museum to explain how the fossilized remains, similar to those collected by the children, have given us this picture of ancient life. Specimens of cephalopods, brachiopods, clams and trilobites are later seen in close-up to illustrate how some forms of life have remained practically unchanged, some have evolved, while others have completely disappeared. A large wall exhibit illustrates the total variety of fossil life.

Dr. Tovell finally considers where fossils may be found. Five examples of good fossil-hunting territory are shown on a map of southern Ontario, although there are obviously many other suitable areas. Those areas shown are the Niagara Escarpment, Arcona Conservation Area, the Bruce Peninsula, Collingwood and the Humber Valley. The program ends with a word of advice on what to do and what to look for when fossil hunting.

SUGGESTED PRE-VIEWING ACTIVITIES

1. Coral shales and limestones often contain fossils. Children could be encouraged to bring in any stones or rocks that have interesting markings, in an effort to classify them or establish the surrounding landform. A short preliminary discussion could then centre around what we can discover about our surroundings from such material.

SUGGESTED POST-VIEWING ACTIVITIES

1. The children could list the different forms of animal and plant life, as suggested by Dr. Tovell.
2. If possible, plan a trip to a quarry, or suitable place, to search for rocks with fossils. The children should plan carefully what equipment they need to take and how they will use it.
3. Arrange a visit to a museum wherever possible.
4. Encourage further reading and research into early life in the seas, climatic changes, or study local geographic conditions, etc.
5. Correlate to other subjects:
   Art – murals, dioramas, models
   – mud or plaster prints
   – abstract pattern work – potato and lino cuts.
   Creative writing – stories and poems.
   – The theme of life long ago could easily stimulate the imagination.
   Science – A simple experiment to show sedimentation could be done by shaking coarse and fine particles (gravel and sand) into a jar of water. To show how ancient mud cracks, (frequently found in rock), were formed, a small amount of water poured over clay should be allowed to evaporate. The clay should then show similar cracks.

Bibliography:

One of the simplest guides for children on this subject is:

LEMON, R.H.H., *Fossils of Ontario.* Royal Ontario Museum (Sales Desk, Price 40 cents).

For teachers the following may be of interest:

MATTHEWS, WILLIAM H., *Fossils – An Introduction to Prehistoric Life.* Barns and Noble, (Everyday Handbook).

NEWELL, NORMAN D., *Crises in the History of Life.* Scientific American Offprint No. 867. W.H. Freeman and Company, 660 Market Street, San Francisco, California 94104. (20 cents U.S.).

RHODES, F.H.T., *The Evolution of Life.* Penguin Books. (No. A512).

The Fossil Story – A film distributed free by the Shell Oil Company, is also of some relevance.

PROGRAM 2

DINOSAURS

The objective of this program is to show that, having started in the water, life moved to the land and the air, and that the story is not yet complete.

PROGRAM CONTENT

The program opens with "Fido", the mountain monitor lizard, in the Vertebrate gallery of the Royal Ontario Museum. Dr. Edmund, the Curator, introduces the idea that he, and "Fido", as well as the dinosaurs, have something in common – a backbone. By the use of models, graphics and specimens, Dr. Edmund outlines the evolutionary development of life, and its movement to land, through the lobefish and the amphibian to the reptile. Commenting on the dominant group of reptiles, the dinosaurs, Dr. Edmund again emphasizes the evolutionary aspect: the first dinosaurs were small (Coelophysis) while the later ones (Brontosaurus and Stegosaurus) were huge. The significance of the egg is shown. Laboratory film reveals how palaeontologists piece together the story of life from bone fragments. In conclusion, the camera focuses on the skeletons of dinosaurs which inhabited Canada (e.g., Edmontosaurus) and the program ends by posing the questions of why and how these huge reptiles became extinct.

SUGGESTED PRE-VIEWING ACTIVITIES

1. The children might discuss how they thought life spread from the seas to the land and air. What developments would be required for this process?
2. The children might also bring to the classroom pet snakes and lizards for study. Those children who possess models of dinosaurs might also bring these for display and discussion.

SUGGESTED POST- VIEWING ACTIVITIES

- Immediate discussion after the program on the extinction of the dinosaurs and what type of life followed them,
- Research and reports on specific groups of dinosaurs,
- Further research into the development of mammals, the changes in vegetation and the development of plant life and reasons for variations in climatic conditions,
- Similar correlation into art and creative writing which was done following program one on fossils.

Bibliography:

The literature on the subject is extensive. Some of the following would be suitable for the grade 4-6 group.

ANDREWS, ROY CHAPMAN, *In the Days of Dinosaurs.* Random House, 1959.

ANDREWS, ROY CHAPMAN, *All about Strange Beasts of the Past.* Random House, 1959.

DARLING, LOIS AND LOUIS, *Before and After Dinosaurs.* Morrow, 1959.

SWINTON, W.E., *Dinosaurs of Canada.* R.O.M. Series.

For teachers:

HOTTON, NICHOLAS, *Dinosaurs,* Pyramid Publications.

PETERSEN, KAI, *Prehistoric Life on Earth.* Dutton.

ROCKETS & SATELLITES

INTRODUCTION

This section of the Junior Science series is designed to bring the topic of space science inside the classroom. Although "Space Travel" is listed for pupils of the fifth year in the Interim Revision Science (P1, J1), the programs will likely prove useful to children throughout the Junior Division.

Many ten-year-olds already have a lively interest in satellites and space vehicles. Others may find that these programs serve as starting points for an inquiry into the science of space. After these telecasts, discussions may develop and small groups may begin working on specific aspects which are described later.

No special preparation of the pupils is necessary before the telecasts, but the teacher should be ready to guide the discussion in the third segment.

PROGRAM 3

ROCKETS IN THE NORTH

PROGRAM CONTENT

The narrator, Mr. Percy Saltzman, introduces Mr. Philip de L. Markham, leader of the party of ten Canadians who launched a Black Brant sounding rocket in 1966 from Resolute Bay towards the North Magnetic Pole. In this first quarter of the program, the children will see the wooden boxes containing the rockets being freighted from Winnipeg, the launching mechanism being set up at Resolute, the nose-cone being added to the rocket, and the crew firing two Black Brants. Mr. Markham describes this expedition which probed the upper atmosphere from a launch site nearer the Magnetic Pole than ever before.

In the second quarter, Mr. Saltzman outlines the basic principle of rocket propulsion: the momentum of the rocket in one direction equals the momentum of the exhaust gases that are thrust out in the other direction. From a fireworks-rocket, the hot materials rush out downwards as the rocket moves upwards. Other examples of the principle are shown. A child releases a balloon and as the air flows out in one direction, the balloon moves in the other. As a boy dives from the stern of a boat, the boat moves forward. As a boy throws things from a boat, the boat moves the other way.

The Black Brant consists essentially of a metal shell and a layer of solid inflammable material inside it. When the solid propellant is ignited, hot gases are produced which stream out with great momentum. In nine seconds, a quarter ton of exhaust gases comes out the nozzle. The rocket case moves in the other direction with an equal momentum.

The third quarter is designed for discussion. Mr. Saltzman explains the idea somewhat like this:

"Any questions? Sorry. *I* can't answer them. I'm here and you're there. But your *teacher* can

help you find answers. Or maybe *you* can answer some of your teacher's questions. Anyway this part of the program is strictly up to you. All *we'll* do is remind you of what you've seen, with some silent pictures . . . Then we'll be back."

Then your class will see a still picture of a technician lifting the nose-cone to attach it to the rocket. The teacher and class will have a chance to discuss what they see, *for there will be no music, no word, and no other sound from the telecast.*

Gradually this still picture will fade out, and a second one of a rocket blast-off will quickly appear. Children will have a chance to ask their own questions about the smoke and flame. About a minute later this picture fades out and a still picture of a fireworks rocket appears. Children now may discuss what they see here. The fourth picture shows the boy diving from the boat so that the children may have a chance to use the word "momentum". The final picture shows a section through a rocket with labels pointing to nose-cone, casting, propellant, fins and nozzle. Again there is a chance for some free discussion before Mr. Saltzman reappears for the fourth quarter.

This last quarter of the program provides further information about rockets. Children can select as much or as little as they wish from this part of the program. They can use whatever parts they wish to augment their conceptions of space travel.

A film is shown of the launching of rockets from the Churchill Research Range. Churchill was selected for a rocket range because of its ideal location near the zone of greatest auroral activity and near good rail and sea transportation.

Small rockets land on the range south and east of Churchill, but the larger rockets are launched to impact in Hudson Bay when the navigation season is over. All rockets are launched from within specially designed buildings, enabling the technicians, scientists, and engineers to prepare the rockets in comfortable surroundings, protected from the extreme cold of winter.

Weather balloons are released before each rocket launching to find the direction and speed of winds near the ground and higher up. From this information, the direction of the launching is changed so that the rocket will make impact at the desired place. The rocket is tracked by radar. During the flight the scientist's apparatus sends messages back by radio. These messages are recorded on magnetic tape.

SUGGESTED POST-VIEWING ACTIVITIES

This program is meant to be a starting point for class discussions that will lead to inquiries by small groups and by individuals. These inquiries will follow children's questions, questions that cannot be predicted accurately in advance.

– Some children may want to find Resolute Bay, Churchill, and the Arctic Circle on a map. This may lead into the history of Churchill from Jens Munck's sailing into Churchill Harbour in 1619 to the construction of the first Hudson Bay Post in 1689 and the arrival of the railway in 1931.
– Some children may be interested in the earth's magnetism, and the way compasses work near the North Magnetic Pole. Others may want to read all they can about ice-fields, and icebreakers.

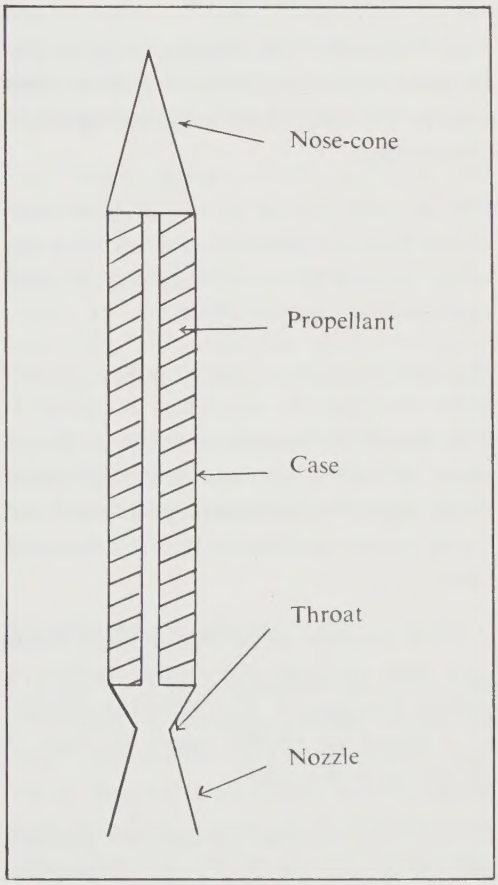
– Some may want to read of the pioneers in the conquest of space: Tsiolkovsky, Oberth and Goddard.
– Some may want to experiment with sausage-shaped balloons. If they are blown full, how far from a launch point will they travel? Does it matter the angle at which they are released? What is the effect of blowing them up only partially?
– Some children may find other rockets mentioned in the newspapers. Some will become interested in satellites, even before the next program on "Satellite Alouette".
– Some children may seek out the message of the second segment: that space vehicles begin moving because they gain momentum and that this momentum originates because the exhaust gases have a momentum in the opposite direction. This message may seem important enough to the teacher, that he will support it by providing balloons for experimentation.

In short, as written on page 4 of the Interim Revision Science:

"The teacher's intention is to encourage each child to find out what he can. In doing this he should not set any limit on what the individual child may achieve. From a starting-point, the child can progress as far as time, resources, and interest allow; to ensure this, a precise definition of content is avoided in the syllabus."

FURTHER INFORMATION

1. Solid fuel may be prepared in rockets. Solid fuel rockets are easily handled, and ignite dependably. However, solid fuel has less thrust than liquid fuels.
2. The Black Brant III has this rating: Payload 50 pounds, altitude 100 miles, diameter 10 inches, length 18 feet.
3. At Churchill the ice breaks in June and the snow disappears. Summer temperatures are in the 50° to 60° range, rising on occasion to 80°. Frost at night in summer is not uncommon. Relatively little rain falls during the summer. On the tundra, insect netting and repellent are essentials.
4. Aurora are most frequent at a height of about 65 miles.
5. Below is a simplified sketch of a rocket:



Bibliography:

KUENTZ, CRAIG, *Understanding Rockets and Their Propulsion.* Rider, 1964. 152 pages.

WILSON, J. TUZO, *I.G.Y., The Year of the New Moons.* Longmans, 1961, 352 pages.

PROGRAM 4

SATELLITE ALOUETTE

PROGRAM CONTENT

The narrator, Mr. Percy Saltzman, introduces Mr. F.T. Davies, Director of the Defense Research Board who was involved in the Alouette program. This satellite was designed to probe into the ionosphere, the part of the upper atmosphere that reflects radio waves back to the earth. The idea was to place a satellite in such an orbit that it could send signals down, right through the ionosphere, to receiving stations on the earth.

To place the satellite in orbit, a powerful rocket was used. Really it was a double rocket. One rocket, the Thor, lifted the rest and then the second rocket, the Agena B, finished the job by giving greater momentum to the satellite.

The "Alouette" was designed and built in Canada, and then placed in orbit on September 28, 1962 from a launching site in California.

The second quarter of the program describes how a satellite keeps orbiting the earth in a circle. A comparison is made with the throwing of a ball.

If a ball is dropped from the hand it will strike the floor in about half a second. If it is thrown sideways it will still strike the floor in half a second but it will travel ahead too. If it is thrown very fast it will travel a great distance before it strikes the floor.

If it is thrown faster still it may travel part way around the world before it strikes the ground. If it could be thrown at a speed of 18,000 miles an hour it would circle the earth.

In the third quarter, several still pictures will be shown. Mr. Saltzman will propose a question which may be used as a beginning for a discussion. The pictures and the questions are listed below.

- Ball released from the hand,
  "What path does the ball take?"
- Ball thrown horizontally,
  "Where did the ball move?"
- Ball moving much faster over a curved earth,
  "What path does a ball take when it moves very fast?"
- Blast off for the Alouette Thor-Agena,
  "What is happening here?"
- Separation from the first stage,
  "What happens when the first stage burns up all its fuel?"
- Satellite in orbit with antennae extended,
  "Where were the antennae during launching?"
- Photo of Alouette,
  "What is the use of the solar cells that cover the satellite?"

In the last quarter, Mr. Davies describes how the signals were received, recorded, and stored.

SUGGESTED POST-VIEWING ACTIVITIES

This program serves as a starting point for inquiries into satellites, and the vehicles used in space programs.

- Some children may collect pictures and data about Alouette I and Alouette II. Others may read about Tiros, Synchron, Telstar and Early Bird, and find out how they are used for communication or for observations on the weather.
- Perhaps the whole class may discuss the significance of the first flights with men aboard satellites, Individuals or groups may wish to learn more of the astronauts — Gagarin, Tirov, Glenn, Nikolayev, Cooper and Valentina Tereshkova.
- Perhaps the children may begin to study the first satellite, the moon, and then the moons of other planets.

But the ventures of the pupils, whether they are made in groups or as a whole class, are not completed until they lead to a product. As written in Interim Revision Science (P1, J1):

"When a pupil has discovered something he will usually want to communicate his findings. The teachers' role at this stage is to provide a diversity of materials, so that each child will choose the medium that will express his discovery in a satisfying way. Sometimes he will prefer to use the written word, sometimes the spoken word. He may choose to paint pictures or to build structures on a bench. On occasion he will make graphs and express his findings in numbers."

FURTHER INFORMATION

1. Alouette II was launched on November 29, 1965 in an orbit with altitude ranging from 500 kilometers to 3,000 kilometers. The point at which the satellite was farthest from the earth is termed the *apogee,* the nearest point the *perigee.*
2. Sputnik I was launched on October 4, 1957. It fell back to earth on January 4, 1958. This first satellite carried few instruments but from the rate of slowing by drag something was learned about the density of the air.

THE STREAM COMMUNITY

INTRODUCTION

This series of six programs is based upon the unit "The Stream Community" recommended for the pupils of the sixth year (see P1, J1, Interim Revision Science). It is anticipated that the six programs will be of the greatest value to the upper Junior Division. However, if facilities are available, pupils in the Intermediate Division should be given the opportunity to benefit from the program as well.

The prime objectives of the series are:

- to see the world outside the classroom as a laboratory for the study of science.
- to show small groups of pupils actively engaged in scientific inquiry,
- to develop an appreciation and understanding of natural environment,
- to gain experience in using scientific methods,
- to see the application of scientific principles,
- to encourage pupils to seek relationships and pattern,
- to show a variety of creative activities for reporting and recording.

The six programs follow one class as it divides into groups to investigate different aspects of a stream. Following the first program, which is an actual field trip,

the study of the individual groups is shown in the classroom situation. Each of these programs includes considerable film footage showing the group at the stream conducting experiments and recording its findings.

SUGGESTED PREPARATION FOR A FIELD TRIP

1. Obtain permission from the proper authorities including the principal, parents, and the property owners of your particular site.
2. Visit the stream and study its possibilities. It is suggested that the teacher spend one hour of study of the site for every hour of class time at the site.
3. Select a stream which has as many of the following characteristics as possible:
   a. narrow enough in some parts to be straddled,
   b. reasonably shallow, but with some variation in depth,
   c. width sufficiently variable to make a marked difference in the rate of flow,
   d. bottom of the stream varying from a clay bottom (fine) to a stony bottom,
   e. meandering,
   f. ample plant and animal life,
   g. readily accessible, the slope of the bank area being moderate enough to permit ease of study,
   h. sufficiently clear to permit group investigation.

SUGGESTED EQUIPMENT

1. Equipment for Collecting
- jars (large and small
- sieves (large and with long handles)
- nets (made from fibreglass)
- small animal or bird cages for containing animals caught
- leather gloves

2. Equipment for Measuring
- thermometers
- tape measures (cloth tapes are better)
- stop watches
- a watch speedometer (can be made by pupils)
- ball and/or block of wood for measuring stream speed
- yardstick for measuring stream depth

3. Transporting Equipment
- large pots or pails to bring back potted plants
- cooler to maintain temperature until specimens reach the classroom

CLASS PREPARATION PRIOR TO THE VISIT

1. Assemble equipment
2. Discuss and demonstrate techniques and equipment.
3. Review general instructions:
   a. basic instructions concerning dress, time of departure, return to school, etc.
   b. instructions concerning purpose, methods, organizations, etc.
4. Arrange the positioning of individual groups so that groups which muddy the stream and disturb the stream bed are downstream from the other groups.
5. Discuss recording techniques and design sheets for the recording of data collected.
6. Make sure that groups have assigned individual responsibilities such as that of recorder, etc.

PROGRAM 5

A VISIT TO A STREAM

The purpose is to show viewing pupils how to set about studying a stream in their own area and how to gather data about it. The program does not attempt to provide all the answers but leaves this for their own investigations.

PROGRAM CONTENT

The first program in this series is a field trip to a stream. It shows five groups of children measuring and examining different aspects of the stream as well as collecting and studying the plant and animal life in the stream environment. It forms the basis for the remaining five programs.

The first group is shown investigating the stream's current. By measuring a ball over a twenty-five foot distance and the number of revolutions of a water speedometer, the rate of flow can be determined. The surface currents are examined by sprinkling wood shavings on the water. One pupil is shown measuring the temperature of the stream at one location.

The second group of students illustrates the methods used in examining the stream bed. Pupils are shown measuring the width of the stream in one of the nine areas selected for study. Others are shown measuring the depth at five points across the stream. Finally one pupil is shown examining and measuring the sizes of stones found in the five points across the stream. The data collected will enable him to see the sorting action of the stream at this particular area.

The group identifying plants and surveying where they grow in relation to the stream forms part three of this program. Close-ups of the skunk cabbage, ferns, jack-in-the-pulpit and Solomon's seal are shown. As a sampling technique, a transit line is used. Pupils, beginning at the stream, turn a hoop end-over-end for ten turns and count the occurrence of the four plants that the group is surveying.

The fourth group is seen catching and examining small aquatic animals. Viewers can see how the nets used are constructed. They will also see the method used by the pupils to catch the insect larvae. Some interesting close-ups will assist the viewer in identifying some of these creatures.

Finally, we see a group of pupils catching larger animals such as a racoon, frog, toad, etc. Interesting close-ups show some of the features of these animals.

SUGGESTED PRE-VIEWING ACTIVITIES

List on the blackboard several definitions of a stream as offered by pupils within the class. Definitions will vary from those which include such things as the banks, bed, etc. The program illustrates the concept that the stream is an entire community which includes the plants and animals in and around the stream as well as the water, bed and banks. The individual definitions of the pupils should be accepted without comment and discussed at the conclusion of the program.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss and refine pupils' definitions of "a stream".
2. Permit pupils to discuss and even speculate about the data that will be collected and the accuracy of the measuring techniques. Encourage them to suggest some of their own.
3. Ideally, it is hoped that the pupils will wish to begin a study of a stream in their community. This will provide an excellent opportunity for them to compare the results of their stream with the stream used in the program. This is the best possible follow-up for the program and if it is at all possible it should be undertaken by the class.

PROGRAM 6

CHARACTERISTICS OF STREAM FLOW

The purpose is to introduce the pupils to some of the factors which affect stream flow and at the same time encourage them to seek information about a stream in their own locality.

PROGRAM CONTENT

The program is introduced with film showing pupils measuring the speed of the stream with the ball and the water speedometer. Viewers will see the ball and the speedometer in areas which show marked differences in their speed. Close-ups will show the current's pattern on the stream's surface.

The scene will then shift to the classroom and will centre around a discussion by the group of pupils who studied this aspect of the stream. They discuss the merits of the techniques used and attempt to evaluate their findings. Flashbacks to the stream will illustrate their findings and the problems they are attempting to solve.

The program will conclude with two students discussing and explaining the maps of the area they are preparing.

SUGGESTED PRE-VIEWING ACTIVITIES

Discuss with the pupils their opinions on the following questions:

1. Will a stream flow at the same rate at each point along its course?
2. At any one point along a stream will the rate of the current be the same all of the way across the stream?
3. Will the amount or the volume of the water vary between rapid and slower parts of the stream?

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss the answers to the above questions in light of the information provided by the program.
2. Develop the concept that a stream is but a small river and that the flow patterns of a stream are similar to the flow patterns of a river. The effects of currents upon transportation, hydro production, erosion, etc., may well provide a beginning to an investigation in these areas.
3. Once more it is hoped that the class will wish to compare the findings, observations and conclusions made by the television class to those they make of their own stream.

PROGRAM 7

STRUCTURE OF THE STREAM BED

The purpose of this program is to help viewers realize the close relationship between the width, depth and speed of the stream and how these three affect the shape of the stream bed as well as the size of particles which are found on the bottom of the stream.

PROGRAM CONTENT

Activities of the group seen on the first program studying the relationship between stream width, depth and speed will be shown in greater detail. In the classroom segment, pupils discuss the data collected and the role played by each in determining the shape of the stream and the nature of the stream bed. They discover that the width, depth, speed and fall of the stream all help to determine the shape of the stream. They also learn that the sorting action of the water is largely determined by the speed of the water.

Mr. Rod Bain of London Teachers' College discusses with the class their problems and demonstrates with a model of the stream made by the pupils, some of the factors affecting the stream bed.

SUGGESTED PRE-VIEWING ACTIVITIES

Program three actually continues the mechanics of the stream as started in program two. Have the pupils suggest what factors affect the flow of a stream. Even before viewing the program they might conclude that the width, depth, fall of the stream and the volume of the water passing down the stream as well as the nature of the bed will all affect the stream's flow. Encourage them to seek the evidence of this while they view the program.

SUGGESTED POST-VIEWING ACTIVITIES

1. Verify the conclusion reached in the pre-viewing discussion.
2. Illustrate the sorting action of the water by shaking a jar of water and gravel and permitting it to settle.
3. Have pupils recall experience in wading in a rapid and slow moving stream. In which was the bottom stony? Smooth?
4. Visit a stream. Note the shape and character of the bed at various locations. As an example select a curve in the stream. Where is the bed the deepest? How do the size of the particles on the outside of the curve compare with those on the inside of the curve? Where is the greatest amount of erosion taking place?
5. Observe the channel (deepest part) in the stream visited. Is it always in the middle of the stream?

PROGRAM 8

PLANT LIFE IN AND AROUND THE STREAM

The purpose of this program is to introduce the pupils to the concept of zonation in plants through observing the changes in plant life as one moves from the moist environment of the stream to another environment.

PROGRAM CONTENT

The program opens with film showing the plant group at the stream collecting and potting various plants and surveying their location in relation to the stream. We then see this group back in the classroom. During the discussion which takes place, close-ups show the difference between such plants as the skunk cabbage and the burdock. Close-ups of the plants surveyed (skunk cabbage, ferns, jack-in-the-pulpit, and Solomon's seal) are shown. Through this close examination of individual plants, the pupils see how a particular plant is adapted to thrive in its environment.

Dr. J. W. Judd of the Department of Zoology, University of Western Ontario, visits the group at the stream and answers questions such as: why does the skunk cabbage grow so close to the stream; what is the difference between the true and false Solomon's seal and why have so many trees near the stream fallen over.

SUGGESTED PRE-VIEWING ACTIVITIES

By means of a short field trip around the school property, the pupils may be able to observe that certain plants grow better in certain environments (such as shade) while others do better in a different environment (sunny). Thus the class is introduced to the concept of zonation and that plants, like animals, have particular needs.

A discussion might develop about what the environment of a stream would be like. How would the environment for plants change as one moves farther from the stream?

SUGGESTED POST-VIEWING ACTIVITIES

1. Collect examples of the plants discussed on television and permit pupils to see them first hand.
2. Set up an aquarium and transplant water plants from a stream or pond and observe those which survive best.
3. Examine scum, algae and grasses under a microscope or with a hand lens.
4. By visiting a stream community, observe types and changes in plant growth as one proceeds farther from the stream.
5. Discuss how plants help in the control of erosion by protecting the soil from heavy rains, by holding it in place with their roots and by forming obstructions such as natural dams to slow down the stream.

PROGRAM 9

AQUATIC ANIMAL LIFE

The purposes of this program are to introduce pupils to some of the common, but rarely seen, small animal life in the stream; to show them variety in nature and the ways of animal camouflage.

PROGRAM CONTENT

Once more the program begins with a return to the field trip of program five. The technique for catching the small aquatic life is recalled. The classroom segment shows this group discussing and examining under microscopes such animals as the mayfly and caddisfly larvae, etc. Pictures obtained through research are compared to their specimens.

Dr. R. H. Stinson from the Department of Zoology, University of Western Ontario, discusses the group's problems with them. Discussion centres around the caddisflies and establishes where they are found, how they camouflage themselves, etc. Excellent close-ups are shown of the different cases of the caddisfly as well as of other specimens caught by the group.

SUGGESTED PRE-VIEWING ACTIVITIES

Unless pupils have some knowledge of the small insect larvae usually found in the stream, it might be well to introduce this program by discussing and listing the animals normally associated with a stream. Pupils can then be led to conclude that there are other animals that cannot be seen because they are either too small or too well hidden. These are the animals that this program will deal with.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discussion of the ways in which animals used camouflage to protect themselves in this program and could be expanded to a general investigation of camouflage in nature.
2. Caddisflies and mayflies might be caught and introduced to the class aquarium.
3. A caddisfly larva might be placed in an aquarium containing only water and crushed glass. It will then construct a transparent "glass" case.

PROGRAM 10

LARGER ANIMAL LIFE

The purposes of this program are to emphasize the need to maintain in the classroom as nearly as possible the natural environment of the animal; to encourage careful observation of animal adaptations.

PROGRAM CONTENT

In the portion of the program showing the children at the stream, we see how they catch animals such as the raccoon, frog and toad. Close-ups of animals such as the chipmunk eating are also included. Some of the birds of the area, crayfish and fish are also shown.

Dr. R. H. Stinson of the University of Western Ontario pays a return visit and discusses the difficulties experienced by the class in keeping their specimens alive. The dragon fly's life history and food are discussed. Some techniques in the dissection of a garter snake are demonstrated.

SUGGESTED PRE-VIEWING ACTIVITIES

This program might be introduced by discussing with the pupils those animals which are normally found in the stream environment. Those that live in, on and near the stream should be included.

SUGGESTED POST-VIEWING ACTIVITIES

1. This program might well introduce a study of why animals live near a stream.

It must offer them shelter, protection from their enemies and a source for food. The concept that other animals such as the raccoon live there because the stream is the home of many of the animals upon which it depends for food should be developed.

2. A study of how animals are adapted to live in a particular environment and to catch their food might be begun.
3. An investigation of the animals which live in and around a stream in the pupils' community might well be undertaken.

SCIENCE – Junior Division
FOSSILS AND DINOSAURS 2 programs of 20 minutes
ROCKETS AND SATELLITES 2 programs of 20 minutes
THE STREAM COMMUNITY 6 programs of 20 minutes

Prog. No.	CBC 9:10-9:30	CHCH 9:10-9:30	CKCO	CJOH	CBOT 10:00-10:20	CKLW
Fossils and Dinosaurs 1	NOV. 1 APR. 18 – 9:50-10:10	NOV. 1	NOV. 13 – 10:10-10:30		NOV. 6	NOV. 20 – 10:40-11:00
2	NOV. 8 APR. 25 – 9:50-10:10	NOV. 8	NOV. 19 – 9:50-10:10		NOV. 20	NOV. 26 – 10:20-10:40
Rockets and Satellites 1	**10:10-10:30** DEC. 6	**9:25-9:45** JAN. 16	FEB. 6 – 9:45-10:05	**9:40-10:00** JUNE 4	**9:50-10:10** MAY 23	FEB. 13 – 10:15-10:35
2	DEC. 13	JAN. 23	FEB. 14 – 9:50-10:10	JUNE 11	MAY 30	FEB. 21 – 10:20-10:40
The Stream Community 1	**9:10-9:30** APR. 14	**9:45-10:05** APR. 14	**9:50-10:10** APR. 23	**10:00-10:20** MAY 6	**9:40-10:00** APR. 14 – 10:10-10:30	**10:20-10:40** APR. 30
2	APR. 21	APR. 21	APR. 30	MAY 13	APR. 21	MAY 7
3	APR. 28	APR. 28	MAY 7	MAY 20	APR. 28	MAY 14
4	MAY 5	MAY 5	MAY 14	MAY 27	MAY 5	MAY 21
5	MAY 12	MAY 12 – 9:40-10:00	MAY 21	JUNE 3	MAY 12	MAY 28
6	MAY 26	MAY 26 – 9:40-10:00	MAY 28	JUNE 10	MAY 26	JUNE 4

SCIENCE - JUNIOR DIVISION